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(54) A cyclone with forced gas stream whirling.

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Description

The invention relates to a cyclone with gas stream whirling, comprising an inlet chamber provided with inlet and outlet stub pipes and connected to a whirling chamber having an upper cylindrical part and a lower conical part and terminating in a drain stub pipe, a middle pipe mounted inside the cyclone, the lower part of said middle pipe being built up from a number of cylinders of increasingly smaller diameter and partially superimposed concentrically on one another, and gaps provided between successive cylinders, whereby vanes (11) are mounted in the gaps in parallel to the axis of the middle pipe.

Cyclones of the type described are used for separating solid particles and liquid droplets from gases. A known cyclone of the type mentioned above (FR-A-437 971) operates on a free whirling principle. The dusted gas upon entering the inlet chamber meets a side partition which transforms the rectilinear movement into a circular movement. The friction between the dusted gas and this partition causes a decrease in the velocity of the gas so that the whirling motion more or less disappears, because there are no means for maintaining a whirling action along the whirling chamber.

There is also known (DE-C-324 260) a cyclone with forced gas stream whirling comprising a whirling chamber in which a middle pipe is mounted. The middle pipe is surrounded by a helical rib. The channel formed thereby is radially outwardly open so that a radial space is formed between said channel and the inner wall of the whirling chamber. Therefore, a proportion of the entering gas departs from the whirl in the channel around the middle pipe and enters the space between vanes provided in the area between said channel and the inner wall of the whirling chamber. However, this proportion of the gas cannot whirl anymore so that the dust being suspended therein is not subjected to centrifugal forces. This non-whirled portion of the gas returns to the lower end of the middle pipe carrying a greater part of dust therefrom into a stack.

The present invention has been defined in order to overcome the problems of the known cyclones.

According to the invention, a cyclone of the type mentioned initially is characterized in that a helical rib defining the cross-section of the gas stream is provided in the cylindrical part of the whirling chamber, and oblique vanes are secured to the cylinders, playing the same role along the increasingly smaller diameter of the conical part of the whirling chamber.

By the invention a cyclone is provided in which the whirling chamber is shaped on the inside in such a manner that lateral propagation of the gas stream under the effect of a difference between the inlet pressure and the outlet pressure is prevented. Moreover, the whirling action is maintained along the entire length of the whirling chamber.

The invention is hereinafter described by way of example with reference to the drawing, in which

Fig. 1 shows a view and a partial longitudinal section of the cyclone,
 Fig. 2 shows a cross section along line D-D of Fig. 1,

5 Fig. 3a shows a horizontal section of the conical part of the whirling chamber along the line B-B of Fig. 1,

Fig. 3b shows a section along the line A-A of Fig. 3a,

10 Fig. 3c shows a section along the line C-C of Fig. 3a.

The cyclone with forced gas stream whirling is built up from an inlet chamber 1 provided with a gas inlet stub pipe 7. The side walls of the inlet chamber 1 have a spiral shape, thereby decreasing gradually the cross section of the gas stream. The inlet chamber 1 is connected to a whirling chamber, the upper part thereof having a cylindrical shape and the lower part a conical shape. Inside the cyclone, a middle pipe 4 is installed which terminates at the top in an outlet gas stub pipe 8 mounted on the inlet chamber 1. The cylindrical part of the whirling chamber is filled inside with a helical rib 5 which restricts the section of the gas stream. The pitch of the helical rib 5 is selected such that the flowing gas should have a velocity equal to that in the inlet stub pipe 7 at every point. Between the edge of the helical rib 5 and the shell of the whirling chamber there is a narrow dust gap.

30 The lower part of the middle pipe 4 is built up from a number of cylinders 6 having increasingly smaller diameters and being partially superimposed concentrically on one another to form a cone, the apex of which is directed downward. The cylinders 6 are provided with oblique vanes 10 which impose a gas whirling suction at constant velocity. Vanes 11 are mounted in parallel to the axis of the middle pipe 4 in the gaps between the successive cylinders 6 to convert the gas whirling motion to a straight-lined motion directed along the pipe 4. The whirling chamber terminates in a drain stub pipe 9 to remove the separated dust. Thus, a channel is formed inside the cyclone by the spiral housing of the inlet chamber 1, the helical rib 5 wound onto the middle pipe 4 and the oblique vanes 10 attached to the outside of the cylinders 6, whereby the dust-laden gas entering by the stub pipe 7 has a constant peripheral velocity.

50 The advantage of the cyclone as described is its high efficiency with simple design.

The cyclone according to this invention can be used for the dust collection of gases in cement plants, foundries and boiler houses.

Claim

60 A cyclone with gas stream whirling, comprising an inlet chamber (1) provided with inlet and outlet stub pipes (7, 8) and connected to a whirling chamber having an upper cylindrical part (2) and a lower conical part (3) and terminating in a drain stub pipe (9), a middle pipe (4) mounted inside the cyclone, the lower part of the middle pipe (4) being built up from a number of cylinders (6) of increasingly smaller diameter and partially superimposed

concentrically on one another, and gaps provided between successive cylinders, whereby vanes (11) are mounted in the gaps in parallel to the axis of the middle pipe (4), characterized in that

a helical rib (5) defining the cross-section of the gas stream is provided in the cylindrical part (2) of the whirling chamber, and oblique vanes (10) are secured to the cylinders (6), playing the same role along the increasingly smaller diameter of the conical part (3) of the whirling chamber.

Patentansprüche

Zyklon mit erzwungener Gasströmungswirbelung, umfassend eine Einlaßkammer (1), die mit Einlaß- und Auslaßstutzen (7, 8) und mit einer Wirbelungskammer versehen ist, die einen oberen zylindrischen Teil (2) und einen unteren konischen Teil (3) aufweist und an einem Ablaßstutzen (9) endet, ein innerhalb des Zyklons angebrachtes Mittelrohr (4), wobei das untere Teil des Mittelrohrs (4) aus einer Anzahl von zunehmend kleinerem Durchmesser aufweisenden und teilweise konzentrisch aufeinander aufgesetzt angeordneten Zylindern (6) zusammengebaut ist, und zwischen den aufeinanderfolgenden Zylindern vorgesehenen Spalten, wobei Rippen (11) in den Spalten angebracht sind, die parallel zur Achse des Mittelrohrs (4) verlaufen, dadurch gekennzeichnet, daß eine spiralförmige, den Querschnitt der Gasströmung definierende Rippe

(5) in dem zylindrischen Teil (2) der Wirbelungskammer vorgesehen ist und schräglauflende Rippen (10) an den Zylindern (6) befestigt sind, die demselben Zweck entlang des zunehmend kleineren Durchmessers des konischen Teils (3) der Wirbelungskammer dient.

Revendication

10 Cyclone avec tourbillonnement de l'écoulement gazeux, comprenant une chambre d'entrée (1) munie de tubulures d'entrée et de sortie (7, 8) et reliée à une chambre de tourbillonnement ayant une partie cylindrique supérieure (2) et une partie conique inférieure (3) et se terminant par une tubulure d'évacuation (9), un tube central (4) monté à l'intérieur du cyclone, la partie inférieure du tube central (4) étant constituée par un certain nombre de cylindres (6) de diamètre progressivement plus faible et partiellement superposés les uns sur les autres de façon concentrique, et des interstices prévus entre les cylindres successifs, des ailettes (11) étant montées dans les interstices parallèlement à l'axe du tube central (4), caractérisé en ce qu'une nervure hélicoïdale (5) définissant la section transversale de l'écoulement gazeux est prévue dans la partie cylindrique (2) de la chambre de tourbillonnement, et des ailettes obliques (10) sont fixées aux cylindres (6) et jouent le même rôle le long du diamètre progressivement plus petit de la partie conique (3) de la chambre de tourbillonnement.

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